

Appl. No. 10/728,796
Amdt. Dated October 18, 2004
Response to Office action of September 8, 2004

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REMARKS/ARGUMENTS

The applicant appreciates the Examiner's indication of the allowability of the subject matter of pending claims 2-6. New claims 8-12 have been added corresponding to claims 2-6 rewritten in independent form including all the limitations of pending claim 1, and new claim 13 has been added corresponding to pending claim 7 as dependent from pending claim 2.

Specification Objections

Page 1 of the specification has been amended to incorporate the related case information suggested by the Examiner.

35 U.S.C. 102(e) Rejections

It is respectfully submitted that the subject matter of amended claim 1 is not disclosed by Khuri-Yakub et al. (USP 5,828,394) for at least the following reasons.

In the present invention, when it is desired to eject ink from the ink ejection port 4 current is passed through actuator 8,9. This causes the actuator to bend generally downwards forming a bulge in meniscus 3 at the port due to the decrease in volume in nozzle chamber 2. The current is then stopped so that the actuator returns to its original position. This causes necking and breaking of the meniscus thereby ejecting drop 12 from the port (see page 10, lines 4-17 and Figs. 1-3 of the present application). This arrangement of the actuator of the present invention is clearly recited in amended claim 1.

Khuri-Yakub discloses a system in which, when it is desired to eject ink from an aperture/nozzle orifice 16, a piezoelectric annular disk 17 is driven so as to oscillate a membrane 13 into resonance about an ink reservoir 14. The manner in which ink ejection is achieved by this is as follows. Under this driven state, the membrane is firstly deflected out of the reservoir with the ink remaining in contact with the membrane (Fig. 7A). Then the membrane returns to its undeflected position causing a bulb in the ink 26 to form at the aperture (Fig. 7B). Then the membrane continues down to extend into the reservoir causing the bulb to break and eject a drop 27 (Fig. 7C). This continues until it is no longer desired to eject ink, at which point the driving current is stopped (see col. 2, lines 46-62 and col. 3, lines 22-35).

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This system of Khuri-Yakub is clearly different than that of the claimed invention. This is because in Khuri-Yakub the "actuator" is continuously driven during ejection and the ink is ejected by the "actuator" first moving away from the reservoir and then moving back towards the reservoir. On the other hand, in the claimed invention the actuator is only activated to displace it towards the chamber, and it is this downward displacement coupled with the actuator's upward displacement once it is deactivated so as to return to its quiescent position which ejects the ink.

Furthermore, there is no motivation from the disclosure of Khuri-Yakub to modify the system so as to provide the above-described system of the claimed invention. This is because the piezoelectric disk of Khuri-Yakub will only function to eject the ink by oscillating at resonance, and therefore it is not possible to arrange the disk in the manner of the claimed actuator.

35 U.S.C. 103(a) Rejections

It is respectfully submitted that the subject matter of dependent claim 7 is not taught or suggested by Khuri-Yakub in view of Asaba (USP 5,850,242) for at least the above-discussed and following reasons.

Asaba does not makeup for the above-discussed deficiencies in Khuri-Yakub. This is because Asaba merely discloses a system in which a heater is used to heat the ink so as to form bubbles therein which causes ejection. Thus, Asaba does not teach or suggest an actuator arranged to eject ink in the manner recited in the claimed invention.

Examiner's asserted pertinent prior art

In USP 5,719,604 the buckling body 2 identified by the Examiner is not part of a roof structure of a nozzle chamber. Rather, the buckling body is disposed beneath a nozzle 12 and ink is ejected therethrough by the buckling body buckling into a cavity 9 of the nozzle to reduce its volume (see Fig. 4).

In USP 6,151,049 the movable member 31 identified by the Examiner merely moves so that ink bubbles produced through heating of the ink by a heat-generating member 2 can pass through to a discharge opening 18 (see Figs. 1A-1D).

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It is respectfully submitted that all of the Examiner's objections and rejections have been traversed. Accordingly, it is submitted that the present application is in condition for allowance and reconsideration of the present application is respectfully requested.

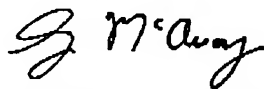
Very respectfully,

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